

# How Great Ships Will Be Moved From Ocean to Ocean

BY FRANK G. CARPENTER.

**Miraflores, Canal Zone, Panama.**  
I AM writing these notes this bright Sunday morning in the great locks at Miraflores. I am within eight miles of deep water in the Pacific Ocean and at the two first great steps up which the steamers will climb on their way across to the Atlantic. Beyond this is Miraflores Lake, and at its end the lock of Pedro Miguel, which, with its boost of thirty feet, shows the vessels to the level of the Culebra Cut, where the canal will be eighty-five feet above the surface of the sea below. It is quiet here to-day, for Uncle Sam keeps the Sabbath. The men have stopped work, the mighty cranes are at rest and long lines of cars loaded with spoil stand on the tracks. That steam shovel down there at the right is black and dirty and it gives no indication of the work it has done the past week.

How hot the sun is and how dazzling! The concrete which walls the lock is made of white sand, and where it catches the rays it is blinding. How high the walls are! I am in a mighty chamber in which you could drop two city blocks of six-story houses and there would be still room to spare.

I walk over to one side and look up with my chin touching the concrete wall. The whole earth is shut off, and the wall reaches the sky. It looks like a smooth white sandstone put together in blocks bigger than those of the pyramids, but far smoother and more closely laid. It is a solid wall and was molded as such, the appearance of blocks coming from the joints in the molds. Midway in the wall is a narrow ladder about two feet in width, and laboriously climb to the top, and it seems as though the ladder would never end.

**The Locks of the Canal.**  
These locks are about the most interesting features of Uncle Sam's mighty Panama works. The ditch itself is wonderful, but its construction has been merely a matter of blasting out earth and rock and carrying them into the hollows or down to the sea. The rocks are remarkable creations in that here man tries to imitate nature and he has built these gigantic rock masses, molding sand, cement and rock into stone.

There are six great locks on the canal. It does not sound big as I write it, but these locks contain cement by the millions of barrels. They have shiploads of sand which has been brought from the Atlantic and Pacific, and mountains of rock have been blasted out and crushed to form their concrete. The materials are now so united that they are one solid stone. Let me give you some idea of the extent of the concrete alone. They contain over four million cubic yards, or enough of this artificial rock to make a solid wall fifty feet high, ten feet thick and over fifty miles long. Such a wall would reach from Washington to Baltimore and have ten miles to spare.

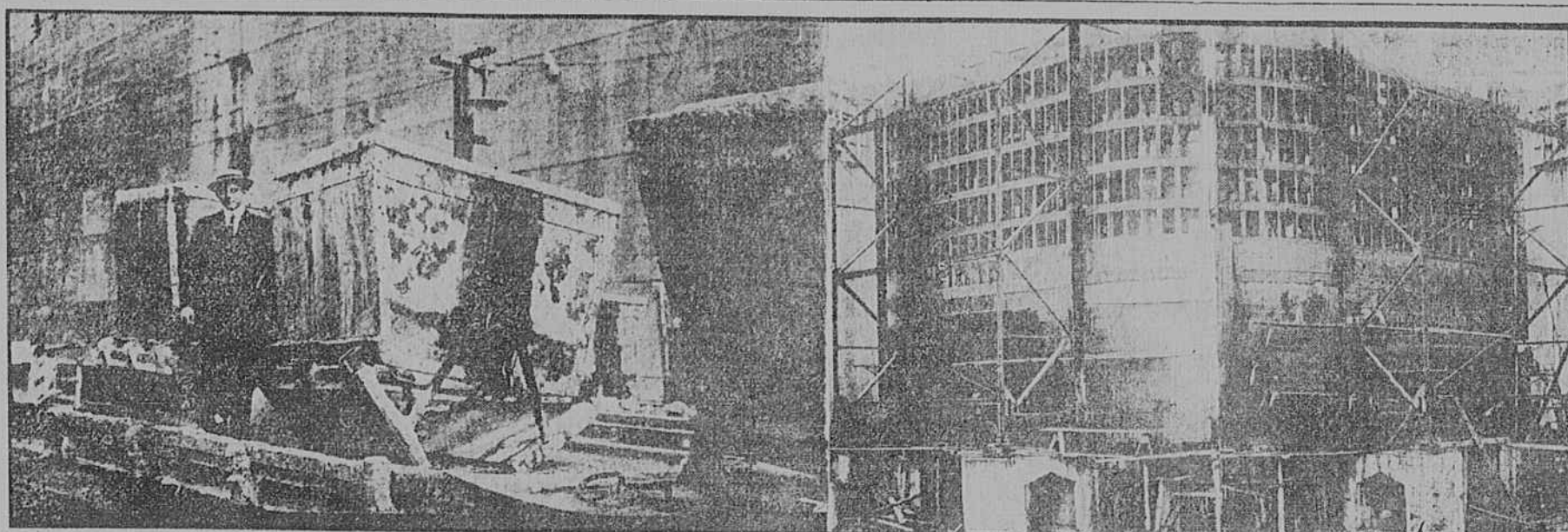
Each of these locks has a twin. The whole consists of two mighty chambers, the side walls of which are about fifty feet wide at the bottom and grow narrower and narrower as they come to the top, where the width is eight feet. They are about eighty feet high. There is another wall in the middle which is sixty feet wide, and within these walls are two other walls, which are closed at each end by the gates.

**No Salt Water in the Canal.**  
So much for the outlines of the structure. The foundations of the locks are as complicated as a cat's paw. They have tunnels and galleries running this way and that, and in their floors are many great holes as big as a four barrel where the water comes into the chamber so fast that they can be filled or emptied in the space of eight minutes. The water is admitted by mighty culverts or conduits which run along the side. These are tunnels through the concrete construction and they will carry rivers from Lake Gatun to lift and lower the vessels.

You often hear it said that we are bringing the waters of the Atlantic and the Pacific together. This is so only figuratively speaking. There will be no salt water in the canal except at the ends. The locks will be filled with fresh water from Lake Gatun, and it will be the Chagres, which we shall harness and make pull up and let down the steamers from ocean to ocean.

But let me tell you more about these big tunnels, into which the water first flows. They are so huge, that you could drive a caravan of elephants and giraffes through them and the elephants might walk four abreast and not touch the sides, while a monkey seated on the head of one of the giraffes would not reach the ceiling. They would easily hold a Pullman train, and a brakeman might stand on the top and not rattle his hair.

These great tunnels or culverts are connected by pipes which run down



In the locks at Miraflores. These huge buckets handle the concrete. My stenographer in the center.

to the bed or floor of the lock chamber, and which are so arranged that when the water is let in it rushes up through the openings and fills the chamber, the water being held in by the gates.

**Raising the Ships From the Pacific.**  
There are only two locks here at Miraflores. The steamer comes straight in from the Pacific when the water in the lock is at sea level. This water is salt. Then the gate at the Pacific end is closed, and in from the tunnel comes the water from the Gatun Lake, having passed through the Culebra Cut and Miraflores Lake. It fills the lock, raising as it does so the ship to the level of the water in the lock above.

The vessel then passes into that lock, through the gate facing the Pacific, and it is raised to the level of the Miraflores Lake and steams through it until it reaches the lock of Pedro Miguel. Here in the second lock it is boosted thirty feet higher, to the eighty-five-foot level of the Culebra Cut. The ship now has a clear, clear steaming way of thirty-one miles, including the cut and the Gatun Lake, before it comes to the Gatun Dam and to the three series of locks which drop it down to the level of the Atlantic.

The matter is simple enough. It is merely like putting a block of wood in a tub and pouring in water to make it rise to the top, like opening a spout in the bottom and letting it drop as the water runs out. The only difference is that the block is small and it weighs but a few pounds, while the ship which will go through these gigantic lock tubs may be as long as was the Titanic or longer, and it may weigh tens of thousands of tons. The Olympic, for instance, has a gross tonnage of 50,000, and I am told, it could easily pass through. The actual dimensions of each of the chambers are 1000 feet long, 110 feet wide and more than 80 feet high.

**Gates Which Cost \$5,000,000.**

The gates to these chambers are even more wonderful than the chambers themselves. The gates are of steel, and in thousands, yes, in millions, of pieces, put together so tightly that they will hold these huge vats of water and raise and lower them with vessels worth millions of dollars.

But first as to the cost. I have said \$5,000,000. The actual sum is more than that. The contract for making them was let by competitive bids in which the United States Steel Trust and four others of the chief steel manufacturing companies of the United States submitted offers. Each had to put up checks for several hundred thousand dollars as a guarantee that it would carry out its bids, but these sums were returned to those who failed, and the lowest bidder was the McAlister-Marshall Construction Company, of Pittsburgh, and its offer was \$5,375,000. This was for the making of forty-six gates, being on an average almost \$117,000 apiece.

The sum seems great until one realizes just what it covers. It includes altogether something like 53,000 tons of steel made up of tens of thousands of pieces, some as big that it takes a mighty steam crane to handle them and others as small as a pin or a needle. For instance, there are more than 400,000 pounds of steel bolts and nuts and a half-million pounds of nickel steel pins. There are millions of pounds of riveted structural steel over three million pounds of carbon steel castings and hundreds of thou-

sands of pounds of Vanadium steel, made up in an infinite variety of parts.

**Some Interesting Items.**  
I have before me the items which formed a part of the bid. They include twenty gates for the Gatun locks, twelve for the locks at Pedro Miguel and fourteen for those here at Miraflores. Some of the gates are seventy-seven feet high, and some as low as forty-seven feet four inches. Each is made in two leaves or doors, which swing back and forth. Think of a door as tall as an eight-story house. Make it about fifty-five feet in width and you may get some idea of these mighty doors, each containing its myriad parts of steel, put together with rivets, which have been made at Pittsburgh and shipped in pieces down to the canal. The weight of the biggest leaves is something like 600 tons, or enough to form a good load for a dozen freight cars.

Think of hanging gates of that kind in such a way that they can swing back and forth at a speed that will not affect the waters which flow in and out, and at the same time quickly enough to allow ships to go through these locks within eight or ten minutes, and you have some idea of the difficulties of their construction.

**The Locks in Miniature.**  
The government has made a working model of these gates in the shops at Gorgona, and it will be on exhibition at the great fair at San Francisco. It is made on a scale of a half-inch to a foot, and it shows not only the construction of the lock chambers, but the method of operating the gates and

other machinery. This model is only six feet four inches long and eight and one-half feet in width. It looks exactly like a lock in miniature with the gates at the end. The gates are perfect imitations, having pins for every rivet and in all about 10,000 pins on the sheet copper which covers them. They are operated by a one-hundred-horsepower motor, and are equipped with such devices that the operation is automatically controlled just as it will be in the great locks here at Miraflores and elsewhere.

**How the Ships Go Through.**  
The vessels are not allowed to move from one lock to another by steam. They are towed by electric locomotives, and there are a number of protective devices to see that they do not injure the locks or themselves on their way through.

There are four towing locomotives, which run upon tracks on each side of the lock. Two of them are fastened to the front of a vessel, moving it forward, and the other two are on the tracks at the rear holding it back so that it can go only so fast. The rate fixed is to be two miles an hour and the locomotives will prevent it being more or less than this.

These locomotives will run on a level excepting where they pass from one lock to another, where they will climb up or down heavy grades. Between the lower and intermediate locks at Gatun, for example, the difference in elevation is over twenty-nine feet.

There are to be two systems of tracks, one for towing and the other for the return of the locomotives when not towing. The towing tracks will have a centre rack, and the locomotives will always operate on this rack. On the return track they will also be a rack on the incline between the locks, but elsewhere the cars will run by friction.

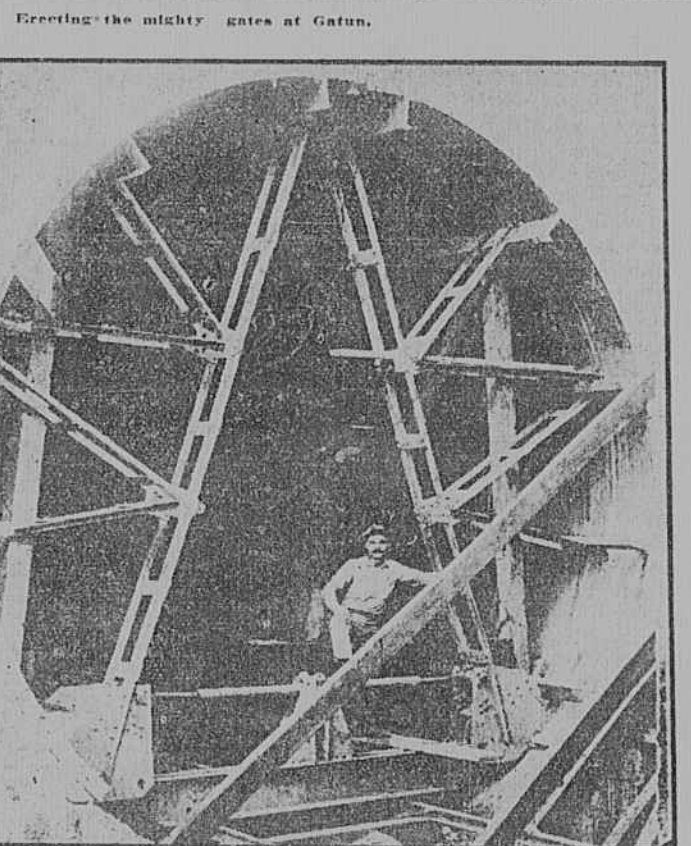
The motive power for running these locomotives will be electricity, generated by the spillway of the Gatun Dam. This, it is believed, will furnish enough electricity not only for all the machinery of the canal, but possibly enough to run the trains of the Panama Railroad.

**Chains to Hold the Ships Back.**  
In addition to the locomotives, the locks have other means of keeping the steamers from striking the gates or going too fast. Among these are chains which run across the lock chambers from one side to the other. These chains are so powerful that they could stop a 10,000-ton vessel going at the rate of four miles an hour within a distance of sixty feet, not only injuring either the ship or the chain. The chains run across from the lock wall to lock wall and from the lock wall to the chain, and they are anchored in such a way that they pull out gradually when struck by the vessel, retarding them and bringing them to a stop.

These chains are enormous. Each link will be oval in shape. Its longest diameter will be as big as the largest dinner plate, and the steel of the link will be about an inch and a half thick. In addition, the gates will be double the upper gate acting as a protection to the lower, so that both would have to break before any damage could come to the lock.

In addition to all this, there are to be emergency dams at the upper end of each set of locks, which will work something like a drawbridge, and thus protect the locks.

**The Water for the Canal.**  
One of the live questions in connection with the locks is whether the Chagres River can furnish enough



This hole will carry the flood into the locks at Gatun. It is about eighteen feet in diameter.

water to keep them full and still accommodate all the traffic that will pass through the canal. The engineers say that it can. The Gatun lake is now being built, and when the canal is completed we will have 161 square miles of water held back by the dam, and this in addition to the regular flow of the Chagres. We shall also have something like two square miles of water in the Miraflores lake.

Engineer Rousseau says that the water supply will amount to more than 80,000,000 tons per annum, and Colonel Crookall says that there will be plenty to accommodate fifty-eight vessels a day, going through the canal, and that this would be more than could pass through in the space of twenty-four hours. It is doubtful whether such a traffic will ever arise, even for one day on the average for 300 days of the year would mean 12,000 vessels, and this is about three times the number which is now passing through our canal at South Ste. Marie.

**Uncle Sam's New Lake.**  
And just now I would like to say something about Uncle Sam's new lake which is now rising out of the jungle. The Gatun dam will soon be finished, and it will hold back the Chagres forming one of the most beautiful sheets of water on earth. The steamers will enter it from the verdure-clad mountains at Culebra Cut, or from the massive locks at Gatun, and will move for twenty odd miles through scenery as beautiful as that of the inland Sea of Japan, or of the thousand islands of the South Pacific. The land along the river runs in and out among islands covered with tropical plants and trees, which will then be the home of monkeys, birds, and other wild game.

For the idea is to drive man from the Canal Zone and make it one great game preserve. These islands are well suited for that, as far as aquatic creatures are concerned. The ducks are already beginning to come, and we shall have parrots and paroquets and possibly the gorgeously plumed macaw of the Amazon.

The Gatun lake will drain a basin bigger than Rhode Island. It will have an area equal to 300 quarter sections of land, and over this the water will rise fast. Much of the bed is still covered with vegetation and with forests half-sunken in the waters.

**The Snake Playing Noah.**  
One of the interesting features of making this lake is Uncle Sam's attempt to play Noah. He has warned the inhabitants of the basin to come out, and has asked them to come to the same fate, and that nothing came. Some of them have stayed in their homes until the steam shovels have lifted their front doors and the water has covered their roofs, and until the water has covered their doors. Now they all have boats tied to their houses, and there will be no loss of life and no flood comes.

The government has already torn down and carried away all the heavy canal structures out of the lake bed, and the lower houses have disappeared, and masses of ruins lie about what was once the main railroad track. Old boats have been swallowed, and the same is true of other towns. In tearing down the houses one was found which was built of solid mahogany. The lumber of this has been saved and remade into furniture.

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**WINCHESTER**  
[Special to The Times-Dispatch.]  
Winchester, Va., August 31.—Mr. and Mrs. J. E. Correll have announced the approaching marriage of their niece, Miss Kathryn Ann Mayo, to Herbert Kepler Sunderland, of Altoona, Pa. The

marriage is to be solemnized at the home of Mr. and Mrs. Correll at noon on September 1.

Announcement has been made of the forthcoming marriage of Miss Velma Edith Bell, daughter of Mr. and Mrs. William H. Bell, of Hagerstown, Md., to Charles A. Richmond, of Boyes, Clarke County, which is to take place on October 5, at the home of the bride's parents, immediately after which the young couple will sail from New York to pass several months traveling in Europe.

Dr. and Mrs. Hugh Greenway Russell and the little daughter, of Richmond, who have been passing the summer at the White Sulphur Springs, are visiting the former's parents, Mr. and Mrs. J. N. Russell, of Richmond.

Mrs. John Randolph Tucker, Miss Annie McGuire and Miss Laura McGuire, are spending several weeks at Atlantic City.

Mrs. Maxwell Swink has returned from an extended visit to relatives in Norfolk and vicinity.

Mrs. Bettie Thompson and her son, Mr. William Thompson, are the guests of Miss Frances Attkin at Madison during the past week.

Mrs. Daisy Haskell has returned to Philadelphia, after visiting Mr. and Mrs. Shirley Carter for several weeks.

Miss Edna Myers, who has been visiting her niece, Mrs. G. O. Miller, returned to Washington yesterday.

Miss Alva Steele has been visiting friends at Madison during the past week.

Mrs. and Mrs. Wallace Allen and daughter, of Washington, have been visiting at the home of Mr. and Mrs. Charles E. Aulick.

Commander Louis McCoy Nulton has returned from Annapolis, where he was acting superintendent of the United States Naval Academy for two weeks, and is now with his family and other relatives in town.

Mrs. Marian Jenkins and Miss Nanette Jenkins, who have been visiting in Norfolk, have returned to Martinsburg, W. Va.

Mrs. Daisy J. Jones, of Norfolk, president of the Rebekah Assembly of Virginia, was in town for the week.

Mrs. Lillie Stone and her young son have returned from a visit of three weeks to relatives and friends in Essex County.

**DURHAM**  
[Special to The Times-Dispatch.]  
Durham, N. C., August 31.—Colonel Edgar Minor has returned from a trip to New York where he has been for several days. He took the greater part of the trip through the country with J. B. Mason, in his machine.

Miss Edna Myers, of Charlotte, is spending a while in the city with friends.

Victor Metz and little son, of Lynchburg, are on a visit to Mrs. Metz's mother, Mrs. W. A. Gattis.

visiting girls, were given the chance to make dates with the young men, and they also furnished the transportation to and from the park. A delicious luncheon was served during the evening.

A moonlight ride was given Friday evening commencing at 8 o'clock. The party of Hookerton, by a number of friends. The party went out to the pumping station, leaving the city at 8 o'clock and returning at 12. The party was composed of Misses Julia Taylor, Eunice Jones, Grace Osborne, Louise Jones, Hulda Jones and Messrs. Lowe, Chaffar, Weisner, Chapman and Towns.

Mrs. Ada M. Smith, Miss Willie Smith and Miss Myrtle Albright have gone to New York on a business as well as a pleasure trip.

Miss Willie Hunter has returned from Columbia University. On her return she spent a few days in Philadelphia, Atlantic City and Washington.

Judge and Mrs. James S. Manning are having a delightful stay at Atlantic City.

Miss Blanche Waltemore is hostess at a house party this week at her home on North Mangum Street. The guests are Miss Mary Mount, of Richmond; Miss Florence Sampson, of Richmond; Miss Helen Attkin, of Petersburg; Miss Elizabeth Craddock, of Houston, Va.; Miss Carrie Exum, of Snow Hill, Md.; and Miss Ella Holt, of Burlington, N. C. The week has been spent in many enjoyable ways.

**MALVERN HILL**

[Special to The Times-Dispatch.]

Malvern Hill, Va., August 31.—The King's Daughters of the Westover and Malvern churches in Charles City County, gave a joint entertainment at the courthouse on Friday last. The chief feature of the evening was a play "Dinner at Six." Those taking part were Misses Mary Lyon Tyler, Martha Lawrence, of Petersburg, B. Monro, of Williamsburg, Mabel Baker, Thomas W. Clark, Mortimer Harrison and Randolph Ruffin. After the play was over there were tableaux and music. Refreshments were sold on the grounds.

The entertainment was a success in every way.

Mrs. Mary E. Bell, of Charles City County, entertained a large audience at Bon Air on Tuesday with her impersonations of the old-time darkeys.

Mrs. S. A. Clark and her daughters, Misses Margaret G. and Betty Clark, returned to their home Tuesday from a two weeks' visit to Mrs. Koshier, of Richmond.

Master Randolph Ruffin, of Weyanoke Stock Farm, is the guest of H. B. Shivers at Upper Shirley.

Mrs. A. W. Russell left Monday for Richmond, where she will spend several days.

William Major, of Richmond, spent Sunday with relatives at Charles City Courthouse.

Master Foster Saunders, of Upper Shirley, and Pinckney Harrison, of Danville, are spending several days with W. B. Saunders, of Richmond.

John M. Cornick, of Onancock, is the guest of C. Hill Carter, at "High Hills."

J. M. Gill, of Granville, spent Thursday of this week in Richmond.

Cards have been received here announcing the marriage of Miss Alice Lee, of Forest, Ontario, Canada, of Rev. J. Allen Christian, of Norfolk, and Miss Evelyn Smith, of Christian, and will be known here, being a son of the late Judge Isaac Christian, of "Woodbourne."

Mrs. S. B. Harrison, of Neston, is the guest of Julian Ruffin, at "Marlborough," in Hanover County.

**SOUTH BOSTON**

[Special to The Times-Dispatch.]

South Boston, Va., August 31.—Miss Katherine Howard, of Washington, is a guest at the home of Mrs. E. W. W. of Washington Street.

Miss Alice Lee, of Forest, Ontario, Canada, is visiting Mrs. W. T. Lea on upper Main Street.

John Sheffield, of New York, is visiting Mrs. J. W. Easley, at this place.

Frank Craddock, of Jackson, Miss., visited relatives in South Boston a few days ago.

Rev. John W. Elliott, ministerial student at Richmond College, who is spending his vacation at his home here, has been visiting several days at the Baptist Church in this place. He seems to be perfectly at ease in the pulpit.

Charles H. Rogers, of Canton, N. C., visited relatives in South Boston a few days this week.

Miss Mary Armistead, of Danville, is visiting relatives in town.

Miss Julia Denny, of Redsville, and Miss Mary Anderson, of Danville, are visiting Miss Julia Crafon, at this place.

Miss Mary Armistead, of Danville, is visiting relatives in town.

Miss Mabel Brooks, of North Carolina, is visiting Miss Virginia Larkin.

W. N. Jefferson, of Philadelphia, Billy Barnett, of New York, and Tom Swann, of Danville, are guests at "Hill Brook Farm," during the week.

Mrs. E. L. Smith, of Richmond, is visiting Mrs. T. C. Watkins, Jr., in East End.

John B. Craddock and family of Texas are visiting relatives in town.

Miss Sara Craddock has returned from a visit to relatives in Texas.

Miss Helen Bruce and family are visiting at the home of Mrs. Mary Bruce, near this place.

Misses Wirt and Hallie Jordan have returned from Bristol, where they have been spending the summer with their grandmother, Mrs. W. J. Carrington.

Rev. James M. Owens left this week for Chicago, where he will attend the National Convention of the Methodist Episcopal Church at St. Andrew before assuming charge of his new field in Louisville, Ky.

**BON AIR**

[Special to The Times-Dispatch.]

Bon Air, Va., August 31.—A very enjoyable recital portraying the negro life, was given by Mrs. Mary Bell, of Charles City County, at the Inn on Monday last while Mrs. Bell was the guest of Mrs. T. L. L. of Bon Air.

Miss Carrie Moore returned from Canada this past week.

Mrs. J. E. Cox and the Misses Cox, of Richmond, have been the recent guests of Miss Augusta Barry.

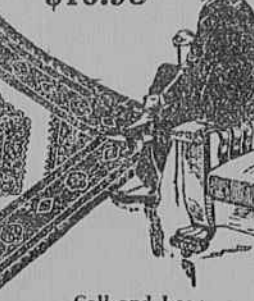
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**THE BIG STORE**  
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One of the live questions in connection with the locks is whether the Chagres River can furnish enough